

OUR BOOKSHELF.

Laws of Physical Science: A Reference-book.

By Dr. E. F. Northrup. Pp. vii+210. (Philadelphia and London: J. B. Lippincott Co., n.d.) Price 8s. 6d. net.

THOSE who at any time have had to look up the laws of some branch of physics rapidly must have felt very seriously the absence of any pocket-book of the type so much used by engineers in which those laws were briefly and clearly stated. They will be in a position to appreciate Dr. E. F. Northrup's book, in which the principal laws are summarised. In a book which so obviously fills a gap in our literature it is perhaps a little ungrateful to point out minor defects. The contrast between the thoroughness of the section devoted to current electricity and the incompleteness and lack of unity of some of the other sections is very marked. On p. 45, for example, the author speaks first of the "force" of a musical sound, and then of the "intensity" of a sound. On p. 47 the velocity of sound is given in terms of quantities expressed in gravitational units, while on p. 51, in another formula for the velocity, tensions are expressed in dynes and masses in grains (probably a misprint for grams). On p. 61 heat energy other than translatory energy is ignored, while on p. 68 many of the general properties of isothermal surfaces and of lines of flow are given as if they held for a point source only. While in magnetism there is a partial definition of unit pole, in electrostatics there is no definition of unit quantity of electricity, and formulæ are given sometimes with, sometimes without, the dielectric constant appearing. In the light section the laws of refraction include the statement that the incident and refracted rays are on opposite sides of the normal, while the laws of reflection contain no corresponding statement. Again, the relative sizes of object and image formed by a spherical mirror are stated on p. 168 as if the only possible objects and images were lines perpendicular to the axis of the mirror. In a second edition it is to be hoped that these defects will be remedied.

The Student's Handbook to the University and Colleges of Cambridge. Sixteenth edition. Pp. vii+703. (Cambridge: At the University Press, 1917.) Price 6s. net.

THE present edition of this useful handbook has been revised to June 30 last. Three important additions only have been necessary in this issue, namely, the regulations for the new English Tripos, the new regulations for the Modern and Medieval Languages Tripos, and certain modifications of the conditions under which prize exercises are to be sent in. The war has occasioned further temporary emergency legislation, and the part of it affecting undergraduates is duly recorded here. The book has been compiled from authentic sources, and its helpfulness to students at Cambridge is undeniable.

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LETTERS TO THE EDITOR.

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Earthquake in Burma.

AN earthquake of some intensity was felt in parts of Lower Burma in the early morning of July 5 last, when the moon was in total eclipse. The only damage reported was at a famous pagoda at Pegu, a town forty-six miles distant by rail from Rangoon, an ancient structure held in great veneration by all Buddhists, and towering 324 ft. over all surrounding buildings. Its golden cone, or umbrella, studded with jewels to the value of many thousand pounds sterling, was shaken down, destroying several smaller pagodas at its base. Fortunately, there seems to have been no loss of life, for the fall happened about 4.40 a.m., when most people were in bed. On festival or fast days there are often thousands of visitors in the precincts of the pagoda, for worshippers come from hundreds of miles distant to this famous shrine, and though the population of the town is less than 20,000, there are often 150,000 there on such occasions. The pagoda trustees and Buddhist elders at once took steps and formed a committee to supervise the removal of the debris and to recover the valuable jewels which had fallen, and in this the civil and police officials rendered every assistance. The Lieutenant-Governor, directly he heard of the disaster, telegraphed to the Deputy-Commissioner:—"His Honour is much distressed to hear of the damage done by the earthquake to your beautiful Shwemawdaw Pagoda, and would be glad if you would kindly convey his sympathy to the pagoda trustees." The trustees wired the following reply:—"We thank his Honour most sincerely for his telegram expressing sympathy at damage done to our beautiful pagoda. Some valuables discovered among the debris."

The largest diamond, which was placed on the top of the golden umbrella, has not yet been recovered, and as Pegu has some thousands of non-Buddhists amongst its population, fears are entertained that many valuable jewels may get into dishonest hands.

The effect of the disaster has, of course, not been wholly bad for everyone. The Burma Railway has had its passenger service from all parts of its line strained to the uttermost. From 5000 to 10,000 people beyond the ordinary traffic are now daily arriving at the town. Taxi-cab and bullock-cart owners are making small fortunes carrying visitors to and from the railway station to the pagoda, situated about a mile distant. These visitors, of course, require food and lodging, so that money to an extent previously unknown, except in holiday or festival time, is now daily circulating in the place.

Pegu is a very ancient town, and was formerly the capital of an independent kingdom. It is mentioned by the first European travellers to Burma in the seventeenth century as a place of great wealth and very populous. It is now one of the largest rice-producing districts in Burma. It will not be very long before its famous pagoda is restored to all its former magnificence, for, although the Burmese are not very familiar or appreciative of co-operation in mundane transactions, all Buddhists are willing to spend money on such a work of "merit" as the restoration or rebuilding of a celebrated pagoda like the one at Pegu, and putting jewels or valuables at such a height in the air that nobody can see them. This characteristic

seems all the more curious when one notices the hundreds of small, dilapidated pagodas all over the country. These, although they may have been built by their own relatives, the Buddhists usually allow to perish from old age and the effects of the climate, and if one inquires into the reason one gets for answer that such repairs would go to the "merit" of the original builder, not to the repairer. They therefore, if they had the money available, prefer to erect another small pagoda or religious building, when they would be acquiring "merit" for themselves. But when money has to be spent over a famous shrine like the one at Pegu, they seem to have a national, rather than a religious, motive in co-operating, and giving what they can afford—it may be a rupee, or a thousand rupees. Hence money for such an object is always forthcoming.

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THE NITROGEN PROBLEM.

UNDER this term we have come to denote a question of most pressing importance at the moment. It not only affects our present and prospective national welfare; our very existence as an Empire is directly and immediately concerned with it. This arises from its bearings upon war and agriculture. Nitrogen compounds are absolutely necessary to the manufacture of munitions; they are no less indispensable to the production of food. All nations, therefore, and, for obvious reasons, especially those which are locked together in a life-and-death struggle, are eager to solve it, and under the compelling strain of a dire necessity an extraordinary measure of success is attending their efforts. This is more particularly the case with Germany, owing to the special circumstances of her position, and to the fact that she and the other Central Powers are practically cut off from external supplies of combined nitrogen products.

That Germany should be so far in advance of other nations in this respect is due to her prior recognition, years ago, of certain factors by which, under the very conditions which she dreaded might arise, and which have, in fact, arisen, her actual existence as a nation might be imperilled. The whole history of her association with the nitrogen problem shows that under the semblance of a peaceful venture it was part of the great conspiracy by which she sought to dominate the world. Her first efforts were made in Norway, when she secured a controlling interest in that country's abundant supply of hydro-electric energy, and took the fullest advantage, as is her method, of other people's originality and pioneering efforts. As the problem evolved itself and the political situation became apparently clearer, in proportion as manufacturing processes passed beyond the experimental stage, the great combines, financial and industrial, at the back of the enterprise gradually unloaded their interests in Norway upon an unsuspecting world. It is doubtful whether the whole of the synthetic stages from atmospheric air to ammonia and nitric acid were in full working order at the time the Serajevo tragedy forced the Kaiser's hand; but, as the

sequel has shown, they were so far advanced that under the stress of compulsion, aided by the financial support of the State and with no hampering commercial restrictions, they could be made to serve the necessity of the nation. We all remember with what a glow of pride Bethmann-Hollweg revealed to the world that Germany's chemists had at length solved the great nitrogen problem, and thereby secured, henceforth and for all time, as he said, her national security.

Owing largely to our command of the sea, our position, and that of our Allies, in respect to this matter is less acute than that of our enemies. At the same time, apart from the submarine menace, which is transitory, there are elements in the situation which require us to pay very serious heed to it. It would be the greatest possible folly on our part to neglect its study. For there can be no doubt whatever that this question of the fixation of nitrogen and the production of synthetic ammonia and nitric acid has come to stay. Matters of this kind have hitherto been considered as outside the business of the State. Government had no direct interest in them. They were subjects to be left to private enterprise and individual effort. But the circumstances of the time have changed much in our time-honoured and traditional view of the mutual relations of the individual and the State. Public opinion, under the hustling influence of the moment, now compels the State to accept responsibilities and exercise initiative to an extent hitherto undreamt of. Accordingly, a number of official bodies connected with the Government are engaged in the consideration of the nitrogen problem, and we are given to understand that a gratifying measure of success has already attended the systematic research work which has been undertaken at their instance. The attempt should now be made to co-ordinate this business with a view to economy of effort and to bring the whole to a common focus. Government Departments are too apt to encase themselves in water-tight compartments, and departmental jealousies are prone to interfere with unity of action.

We trust that, in view of the urgency and serious nature of the matter, no such trivial considerations will be allowed to operate. The Nitrogen Products Committee of the Ministry of Munitions, constituted more than a year ago under the auspices of the Munitions Inventions Department, is no doubt primarily concerned with the matter, for at the moment the question affects the prosecution of the war and is, therefore, of the first consideration, and every agency should be directed to that issue. In solving the problem as it affects war we incidentally go far to solve it as it affects peace and agriculture. The Comptroller of Munitions Inventions has just issued a report giving a general account of the action which has been taken by his Department in dealing with the subject, and he promises a more complete report based upon the work of the various sub-committees which have been instituted to deal with its several aspects.